

Commercial Fisheries Abstracts

a monthly summary of important developments
for the fishery industries

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Commercial Fisheries Abstracts



Prepared in the Branch of Commercial Fisheries

EDITORS

A. W. ANDERSON, Chief, Branch of Commercial Fisheries

DONALD Y. ASKA, Chief, Educational and Market Development Section

ASSOCIATE EDITOR

MAURICE E. STANSBY, Chief, Pacific Coast and Alaska Technological Research

ASSISTANT EDITORS

KATHRYN L. OSTERHAUG, Fishery Products Technologist, Seattle

F. BRUCE SANFORD, Chemist, Seattle

Applications for **COMMERCIAL FISHERIES ABSTRACTS**, which is mailed free to members of the fishery industries and allied interests, should be addressed to the

Director, Fish and Wildlife Service, United States Department of the Interior, Washington, 25, D. C.

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The abstracts in this leaflet may be left in their present form; but it is suggested that to make the most efficient use of them, they be cut out on the lines designated and filed by the number in the upper left-hand corner of each. For a full description of this filing system see "Fishery Technological Abstract Card System" by Maurice E. Stansby and K. L. Osterhaug, Fishery Leaflet No. 232, obtainable free by request from Fish and Wildlife Service, Washington 25, D. C.

In addition to the regular abstracts, there is included a bibliography of references of secondary importance (without abstracts). These may be cut off on the lines designated and pasted on standard 3 x 5-inch cards for filing.

Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

- | | |
|---------------------------|----------------------|
| 0 General and theoretical | 5 Vitamins |
| 1 Fish by species | 6 Fishery byproducts |
| 2 Fresh fish | 7 Analytical Methods |
| 3 Preserved fish | 8 Composition |
| 4 Oils | 9 Miscellaneous |

1.01 WORLD FISHERY SURVEY PLANNED Anonymous Journal of the American Dietetic Association 31, 569 (June 1955) Greater use of aquatic resources for food could easily be at least doubled without affecting the productive capacity of seas, lakes, and rivers, according to an estimate of the Food and Agriculture Organization of the United Nations. To gain more exact knowledge of the possible food supplies which could be obtained from the world's waters, FAO proposes to conduct a world survey of living aquatic resources. At present, FAO estimates, the world's water areas (which cover three-fourths of the earth's surface) provide about 1 percent of man's total food supplies and about 10 percent of his total animal proteins. A possible doubling of this yield, it is felt, is "very likely a minimum, but any considerable upward revision must probably wait for a more accurate assessment of the world's marine resources." It is for this purpose that the survey is planned--to provide as accurate a picture as possible of the stocks of fish throughout the world, how they are divided between species, where they are, their normal migration patterns, and what is happening to these patterns. In the April issue of FAO's periodical, <i>Memo</i>, latest statistics on world fish production and consumption are given. In 1952-53, annual world fisheries production was about 27 million tons, live weight, including turtles, seaweeds, mollusks and crustaceans, but not including about 2 million tons of whale. About 90 percent of this production came from salt waters, the remainder from inland waters. Nearly 12 million tons, or over 40 percent, came from the Far East and about 7.2 million tons from the European region. Other regions produced rather less. North America being the highest with an annual fisheries catch of 3.5 million tons. About 40 percent of this total catch was consumed (over) COMMERCIAL FISHERIES ABSTRACTS VOL. IX, NO. 1, PAGE 1 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE Reprinted in whole	1.87 HOLDING LOBSTERS ALIVE Anonymous Trade News 8, 3, 4 (August 1955) About 60 percent of Canada's lobster catch is marketed alive. The world's largest lobster pound is located at Deer Island in New Brunswick. In order to coordinate the market demand for lobster and the lobster catches, it is necessary to hold lobsters alive anywhere from several days to several months. Mortality is often great during this time due to unfavorable holding conditions. In order to cut down on lobster mortality, scientists of the Fisheries Research Board of Canada have been carrying out experiments on the holding of live lobsters. In the experiments over 7,000 lobsters were held under various conditions. Results indicate that the three most important factors involved in holding lobsters in pounds are: (1) water temperature, (2) the amount of salt in the water, and (3) the amount of oxygen dissolved in the water. A deficiency of any two of these factors in combination is lethal. Lobster normally live in fairly shallow water where the temperature extremes range from a low of about 30° F. in winter to a high of about 75° F. in summer. Sea water along the open coast usually contains about three percent salt by weight. The amount of oxygen dissolved in sea water is affected both by temperature and salinity. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. IX, NO. 1, PAGE 1 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Kathryn L. Osterhaug
1.2 CAPELIN ANALYSES Andrews, G. L. (Newfoundland Fisheries Research Station, St. John's Newfoundland) Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 59, 6-7 (August 1954) Capelin are both plentiful and readily available in Newfoundland during their spawning season in June and July. As a consequence, they are used extensively as bait for cod, fertilizer for potatoes, seed as food for mink and dogs. They are also processed into canned pet food and marketed fresh, frozen, salted, smoked, and dried. Recently, a herring meal plant in Corner Brook has used capelin in the manufacture of meal and oil. In this way the meal plant has extended its season of operation beyond the end of the herring season. Capelin taken in Conception Bay, Newfoundland, by cast net from the beach at Lance Cove on June 20, 1951 and from the beach at Topshill on June 24, 1953, were used whole or in the round for analysis. Samples were selected at random. Fat was extracted with the ether as the solvent in a Bailey-Walker fat extraction apparatus. Results of the analyses appear in table 1, over. The data shows that capelin males are somewhat larger and fatter than the females. The males also have a larger bone structure and a slightly higher ash content. Spawning capelin usually have a few grams of sand in their stomachs that would increase the ash content of the whole fish. Their fat content also would be slightly higher and their moisture content lower before spawning than after spawning. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. IX, NO. 1, PAGE 1 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerdt	2.112 DIVER SEES PRAWN TRAWL IN ACTION George, R. W. and Godfrey, K. C. Fisheries Newsletter 14, 17 (July 1955) The successful introduction of self-contained diving units into fisheries research in the United Kingdom indicated that further direct observations on working nets would be profitable under Australian conditions. An otter-trawl net with a lead line length of 36 feet rigged for prawn trawling was towed from the State fisheries vessel <i>Lancelin</i> at 1 1/2 knots on sandy bottom in 3 to 5 fathoms. Initial observations were made from a dinghy towed behind the <i>Lancelin</i> directly above the net. The dinghy was also used as a platform for the deeper direct observations with the self-contained diving apparatus. The net was found to work smoothly along the bottom, the lead line just scraping the surface of the sand, and with the meshes of the wings and body of the net fully open. Sand, stirred up by the trawl doors obscured the codend, but glimpses through the cloud of sand indicated the meshes were not fully open. The doors were observed to be at right angles to the warps and vertical to the bottom. Trawling was successful at the same towing speed after the angles of the doors were altered at the chains, giving an easier pull on the warps, setting the doors at approximately 45 degrees to the warps, and resulting in the doors being at angles of approximately 15 degrees from the vertical. No apparent changes in the overall shape of the net were produced by the alterations at the chains of the doors. Measurements showed the cork line to be 6 feet above the lead line and overlapping it by approximately 10 inches. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. IX, NO. 1, PAGE 1 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: E. A. Schaefers

1. 2

TABLE I
Analyses of samples of whole capelin from Conception Bay, Newfoundland

No. fish in Sample	Sex	Maturity	Average total length inches	Water % c	Protein % N x 6.25	Fat % c	Ash %	Total
(At Lamer Cove, June 20, 1951)								
10	M	Partly spent	7.3	69.73	15.64	3.23	...	87.68 ± 0.58
10	M	Partly spent	7.3	70.48	13.60	4.12	...	97.20 ± 0.58
10	F	Full of eggs	6.4	79.55	13.83	3.37	...	96.75 ± 0.58
(At Topsail, June 24, 1953)								
20	M	Partly spent	7.1	80.27	14.19	3.64	2.20	100.30
20	F	Full spent	6.0	76.93	14.19	3.80	2.09	100.11
30	P	Partly spent	6.3	80.10	14.49	3.09	1.84	99.52
22	F	12 partly spent 10 partly spent	6.4	80.33	14.56	3.06	1.84	99.81

1. 01

fresh, 7 million tons were cured, and further quantities were frozen, canned, and reduced to oils and meals.

In some areas, says Memo, "fisheries resources were not being exploited to an extent anywhere near their safe productivity. Other places which are good fishing areas are virtually neglected altogether."

FAO declares, "There are other less commonly exploited food resources which cannot be ignored. Such resources are the zoo-planktons, which are taken in considerable quantities in Asian countries for the manufacture of pastes and other fisheries products. Or seaweeds, which, suitably processed, can yield large quantities of foods rich in carbohydrates. It has been estimated, for instance, that Scotland alone could produce from 70,000 to 110,000 tons of carbohydrate annually for human or stock consumption, from seaweeds harvested along the coastline. In fact, production from the world's water areas is not limited by the number of fish to be caught but merely by man's present ability to find, catch, and distribute."

2. 112 (Cross Reference: 2. 12)

Flathead, whiting, and stingrays were identified swimming inside and in front of the moving net, and crabs, squid, cuttlefish, shells, and ribbon weed were also taken.

These underwater observations were made while the swimmer was holding the cork line or standing on the trawl doors. The position of the swimmer did not appear to affect the net's operation in any way.

This direct observation method of evaluating the fishing efficiency of a trawl net before and after certain modifications reduces hit and miss methods to a minimum.

As a research tool, the use of self-contained diving units in assessing numbers and habits of marine animals has not yet been fully appreciated.

1. 87 (Cross Reference: 2. 20)

Under experimental conditions it was found that lobsters can adjust themselves to changing water conditions. In commercial holding, difficulties usually occur because of an extreme change in temperature, salinity or amount of dissolved oxygen, or because a deficiency of two of these factors occur in combination.

If the salt and dissolved oxygen content are normal, the lobster can be held alive for several days at remarkably high temperatures. Lobsters accustomed to 40° F. can live in water as high as 75° F., and those used to 80° F. can live in water as high as 90° F. In contrast it was found that lobsters accustomed to relatively high temperatures can be killed by a sudden drop in temperature. For instance, lobsters held at 60° F. died when placed in water at only 40° F. There is a real danger of killing lobsters by shipping them in very cold refrigerated cars during the summer.

It is recommended that lobsters be kept at temperatures between 40° F. and 65° F.

FORMATION OF TRIMETHYLAMINE IN THE SPOILAGE OF FISH

Nikkilä, O. E.
Suomen Kemi, b 24, 54-60 (1951)
Food Science Abstracts 27, 402 (July 1955)

Spoilage, as indicated by the formation of trimethylamine, in Baltic herring (*Clupea harengus*) was investigated. The formation of trimethylamine and of ammonia began simultaneously, and occurred in parallel for a short time. After about 8 days at 0° C. or 4 days at 18° C., the ammonia content of the fish continued to increase, but the formation of trimethylamine decreased, and finally ceased. In fish in a condition of advanced spoilage, there thus appears to be no formation of trimethylamine, and the substance is broken down or partly oxidized. Like freshwater fish, Baltic herring contains no trimethylamine oxide, and the trimethylamine must therefore be formed from other sources. This was further investigated by studying the formation of trimethylamine in cooked fish and in broth contaminated with bacteria causing spoilage. In both these materials trimethylamine was formed in considerable amounts; it must have been formed by bacterial action independently of the presence of trimethylamine oxide, and probably through methylation of ammonia. It is believed that the methylated ammonia is then oxidized to trimethylamine oxide, and that the oxide may again be reduced, depending on the redox potential of the fish flesh.

COMMERCIAL FISHERIES ABSTRACTS VOL. IX, NO. 1, PAGE 3
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

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SEASONAL WEATHER FORECASTS WOULD AID FISHERMEN

Anonymous
National Fisherman 36, 11-12 (July 1955)

The weather plays an important role in the life of a fisherman, his craft, and his gear. His operations are subject to weather conditions, which may determine the success or failure of his work. Moreover, inclement weather, chiefly excessive heat, may cause the loss of the catch by spoilage.

Traditionally, fishermen have established a weather lore for themselves and hour by hour interpret signs observable by them; however, a single observer can only guess at what lies beyond his horizon, and can have no inkling of weather which, although approaching rapidly, moves some hundreds of miles away.

In the conduct of his operations the fisherman continually makes decisions which involve a reference to weather; to proceed to sea, what course to set, when and where to fish, and so on. Thus the great need for reliable information for fisherman. The need is especially important, and in some ways greater than that of commercial navigation lines or at least more urgently require development, because (a) the nature of his operations require the fisherman to "stay with the weather," and (b) because fishermen in most instances operate away from usual traffic lanes. Further, the urgency is increasing now because all over the world, fishing operations are being pressed beyond usual limits into areas in which traditional lore of fishermen ceases to have effective relevance.

Two types of information may be considered: first, general seasonal predictions are related to the fact that of any fishing season only a portion may be used by the fisherman for fishing. If the fishing fleet could be given some overall prediction of the general weather characteristics during the

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ABSTRACTER: Harold C. Johnson

TRIMETHYLAMINE IN FISH SPOILAGE

SEASONAL WEATHER FORECASTS

NORTHERN WAVE'S L 100,000 EXPERIMENT

Anonymous
Modern Fishing 4, 192-194, 215 (May 1955)
Modern Refrigeration 58, 197-199 (June 1955)

Objectives of the experiment. --(1) To discover if it is practical and economical to replace the unsold surpluses of fresh fish with prime quality quick-frozen fish and thereby secure a general improvement in the quality of fish caught in distant waters; (2) To determine if it is practical and efficient to install freezing equipment aboard distant-water trawlers so that they can stay on the fishing grounds for 1 or 2 additional days on each voyage.

Plan of the experiment. --The quick-freezing plant on the Northern Wave will freeze 500 pounds of fish per hour, and about 5,000 stones of fish on each of the experimental voyages. This is about 20 to 25 percent of the trawler's average catch. The rest of the catch will be iced. Although the vessel is operated by the crew of the trawler, the experiment will be supervised by the staff of the U. S. I. R. and the Whitefish Authority. During the experimental period the Northern Wave will land or catch either at full or at Grimsby where the frozen fish will be sold to coastal merchants and processors. An effort will be made to determine if the product is satisfactory for fishermen, fish friers, and the public.

Description of the vessel. --The Northern Wave, a 188-foot oil-fired steam trawler with a hold capacity of about 18,000 cubic feet, is similar in size and capacity to the steam British deep-water trawlers. Part of the original fish hold has been converted for experimental use, but the hold capacity will still permit the ship to return to port with a larger than average catch. To freeze the fish as fast as they were caught would require a refrigeration installation over three times the (over)

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NOW THEY'RE "HOSING DOWN" THE HOLD WITH ICE

Anonymous
Southern Fisherman, 1955 Year Book, 116

A method of icing fish that was developed by a Seattle firm during World War II for preserving liver vitamins has proven so successful that the special machines used are now being manufactured for use all over the world.

The machine produces a dry sub-cooled flake ice that can be stored indefinitely in refrigerated storage bins and remains free-flowing. Plants may be set up so that only one man is required to operate the complete plant. Ice is blown from the plant, at the rate of 30 tons per hour, into the holds at near zero degrees.

The ice forms a crust, depending on the weather, from one-half to two inches thick all around the outer surface. When the fishermen are ready to ice their catch, they break through the crust and shovel ice into the hold. The crust serves as insulation so that the ice underneath remains as free flowing as when it was made.

An important feature of this ice is its size and texture. Particle size must be small to allow for maximum contact with the fish or shellfish. There should be no cavities around the fish not filled with ice. As the ice melts, it carries the fish slime to the bottom of the boat where it is pumped overboard.

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2.14 forthcoming season, it might be possible to make adjustments in the plan of operations according to whether a low or high proportion of fishing days was likely to be available. An example of this information would be the onset of the monsoon. Secondly, day-by-day (and even within-day) predictions -- this is already furnished to fisherman in many countries, however, there is a need, even in advanced countries, for further development of the meteorological service in itself, comprising observation and analysis as well as the service for communicating the observational information and the predictions to the fisherman. Commercially some attempt has been made to provide the kind of forecast the fisherman needs. A special characteristic being that it is much less noncommittal than the official forecast, and takes a chance on probability in advising for or against operations in a particular area. This suits the skipper who, after all, cannot be sure of the accuracy and means an indication of probability, as well as certainty. Recognizing the value of this weather service, and skipper probably would be prepared to make some contribution to the task of observing and recording weather. This would be especially valuable because often fishermen are the only observers present in an area.	2.15
2.01	2.118 size of the one that was provided. As the freezing rate is less than the average catching rate, it is necessary to stow fish temporarily in crushed ice. This would be necessary in any case because the catching rate varies from haul to haul, whereas the capacity of the freezer is constant. Description of the process. --Most of the fish caught on Arctic grounds are cod. They will be gutted and washed, then frozen whole in slabs of about 80 pounds each. The pilot-scale vertical-plate freezer installed on the Northern Wave was designed and built at the Torry Research Station and tried successfully at sea. In this type of freezer the fish are placed between vertical metal plates, held at -35°F., and frozen into slabs $36 \times 18 \times 1\frac{1}{2}$ inches in size. After about $4\frac{1}{2}$ to 5 hours, the slabs reach 0°F. and are released by moving the plates apart and simultaneously warming the metal with hot refrigerant gas. The Northern Wave has sixteen freezer units that are loaded in rotation. Each unit produces three slabs at a time. Description of the refrigeration installation. --The freezers, which are installed in the refrigerated hold, are loaded and operated from fore-and-aft passages communicating with the iced fish hold in the hold. Two 28-h. p. single-stage condensing units serve the freezers and one automatic 8-h. p. single-stage condensing unit serves the hold grids. All refrigeration is of the direct expansion type working on Arcton 6. The refrigerating machinery is installed forward of the fish hold. The installation throughout the vessel is slab cork set up in hot bitumen, finished on the sides and deck-head with emulsified bitumen, and painted with aluminum paint.

2. 115 NEW TRAWLER IDEAS Anonymous Fisheries Newsletter 14, 23 (June 1955) Two ideas which may have far reaching effects on future trawlers are being tried out on West Germany's new research ship <u>Anton Dohrn</u> says The Fishing News (London). They are a shelter deck and an "active rudder." The codend of the trawl is lifted an extra 7 feet above the shelter deck which has circular hatches, 5 feet in diameter. The codend is emptied through these hatches on to the main deck where, sheltered from bad weather, the crew can continue to sort, head, and gut the catch. It is hoped that this will enable trawlers to operate in weather which now brings work to a stop. The "active rudder," which has been fitted to a few vessels other than fishing boats, incorporates a small propeller, driven, in the case of the <u>Anton Dohrn</u>, by a 100 h.p. electric motor. The "active rudder" greatly increases the manoeuvrability of a vessel and, it is hoped, will enable the 1000-ton research ship to engage in drift netting as well as trawling. Hitherto the size of drifters has been restricted to ensure manoeuvrability, yet larger ships are often needed to handle large shoals of herring. <u>Anton Dohrn</u>, which was built at Cuxhaven and was to go into service in March, is 209 feet overall, with beam of 33.4 feet and depth of 22 feet including shelter deck, or 15 feet from main deck to keel. Gross tonnage, excluding shelter deck, is 939 and displacement 1325 tons. She is powered with an 850 h.p. triple expansion steam engine, with exhaust steam turbine, and on trial did over 12 knots with the main engine alone. She carries a crew of 27 and 15 scientists, and has ample laboratories. She cost about L 300, 000. COMMERCIAL FISHERIES ABSTRACTS VOL IX NO. 1 PAGE 5 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	2. 3 QUALITY STANDARDS FOR CRABMEAT Szabo, Lorain Southern Fisherman, 1955 Yearbook, 86, 221 The Blue Crab Committee of the National Fisheries Institute (NFI) has evolved a Voluntary Industry Code which has the following objectives: 1. To safeguard the health of persons eating crabmeat. 2. To assure uniform inspection of procedure and sanitation standards among the subscribers to this code. 3. To provide for an accredited list of crabmeat packers subscribing to this voluntary industry code. 4. To provide operators of cooked crab establishments and crabmeat plants with an adequate, practicable guide for the construction, equipment, maintenance, and operation of their establishments. The code establishes standards for the various structural aspects of the plant: picking operation, cleaning and sterilizing of equipment, and all other matters directly and indirectly concerned with crabmeat production. The plan is to accredit crabmeat packing plants that subscribe to and live up to the Voluntary Industry Rules and Regulations. The NFI will submit to the regulatory agencies in areas where fresh crabmeat is marketed an approved list of plants, but only after all plants have had an opportunity to review the code and then subscribe to it. COMMERCIAL FISHERIES ABSTRACTS VOL IX NO. 1 PAGE 5 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE
2. 15 ANNUAL REPORT TO THE DANISH FISHING INDUSTRY Anonymous Årshæfting fra Fiskeriministeriets Forsøgslaboratorium for 1954, 32 pages (1955). Copenhagen, Denmark Fat in herring and sand eels. --Samples (23) of herring taken during the period from February 8 to May 4 and representing a catch of 375 metric tons (m. t.) of spring herring from Bloeden Ground had a fat content of 1.5 percent minimum (March 22), 6.4 percent maximum (February 8), and 3.9 percent average. Samples (12) from a catch of 457 metric tons (m. t.) taken in the period July 6 to November 8 had a fat content of 11.8 percent minimum (July 26), 21.1 percent maximum (September 13), and 16.8 percent average. Samples (12) of herring from the Fladen Ground to the Western Skagerrak, representing a catch of 164 m. t., had a fat content of 10.2 percent minimum (September 20), 21.8 percent maximum (July 26), and 14.8 percent average. Samples (8) of sand eels from Esbjerg, representing a catch of 78 m. t., had a fat content of 4.7 percent minimum (May 10), 10.4 percent maximum (May 24), and an average of 8.1 percent. Chilling of fish. --The total bacteria count, trimethylamine, and total volatile base nitrogen content of eviscerated cod increased more rapidly if the cod were kept at 32° F. without ice than if the cod were iced and kept at an air temperature of 40° to 45° F. The washing action of the ice from the melting ice is believed to have caused the difference. Eviscerated cod cooled from 51.8° F. to 33.8° F. (backbone temperature) when covered with ice in 20 kilogram boxes. If there was ice only in the bottom of the box, the cod cooled to only 39.2° F. The boxes were held in a room at about 50° F. Eviscerated cod iced in boxes with sea water flake ice fell after several days to 28.4° F., whereas cod iced in boxes with fresh water ice fell to and remained at (over) COMMERCIAL FISHERIES ABSTRACTS VOL IX NO. 1 PAGE 5 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	2. 3 THE SANITIZATION OF FROZEN FOOD WAREHOUSES Parker, Milton E. (Illinois Institute of Technology) Frozen Food Field 21, 20-23 (July 1955) Sanitization refers to the use of chemical agents which render surfaces aseptic by eliminating or inhibiting factors responsible for the spoilage of material normally kept in refrigerated warehouses. The discussion is limited to representative agents which are of general application in all warehouse sanitization. Ordinary macroscopic constituents such as dirt, filth, and corruption are contrasted with their frequently accompanying microscopic partners, the bacteria, yeasts, and molds. Detergents as sanitizers. --A detergent is any substance which increases the cleaning effectiveness of the water, or solvent used. Its efficiency depends on the extent of the effect, and the time and energy necessary to accomplish it. Properties of a good detergent are listed as follows: (a) rapid and complete solubility in the water used; (b) adequate water-softening or conditioning; (c) good penetrating action; (d) good dispersing power; (e) effective peptizing action; (f) fast dissolving action; (g) excellent emulsifying properties; (h) relatively non-corrosive and non-staining to food contact surfaces; (i) rapid and complete rinsing properties; (j) non-toxic and germicidal in action; (k) economical to use. Soil types. --The term soil is used to include dirt, films, residues and deposits which may also contain bacteria, molds, and yeasts, as well as residues from previous improper use of detergents and sanitizers. The physical condition of the soil is also important. It may be a fresh, loose deposit or a bake-in incrustation. (over) COMMERCIAL FISHERIES ABSTRACTS VOL IX NO. 1 PAGE 5 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

2.15 (Cross References: 3.17, 3.238, 3.24)

between 32° and 31.1° F. There was no significant difference in the temperature on the quality of the two lots after 2 weeks in ice.

Eviscerated cod iced with block ice that contained 1,000 p.p.m. of Vedunal (a Dutch preservative) were compared with eviscerated cod iced with block ice that contained 2 p.p.m. of aureomycin. Aureomycin ice delayed the growth of bacteria and the onset of spoilage for a few days, whereas Vedunal ice had no effect. A lightly salted liquid smoke-flavored cod now being sold in place of smoked salmon was found to contain 4 percent salt and 80 percent water. With care in sanitation and handling, the Laboratory was able to prepare smoke-flavored cod that would keep 8 days at 70° F. Ordinarily, smoke-flavored cod will not keep more than 4 days at 70° F. even if preservatives are added.

Frozen shrimp.--Deep sea shrimp (*Pandalus borealis*) frozen in Cry-O-Vac bags and held for 6 months at -4° F. had a quality very near to that of fresh shrimp. These bags of shrimp, however, freeze into irregular shapes and cannot be packed into uniformly-sized retail cartons. Storage experiments, (incomplete) conducted with shrimp cooked in fresh water, block frozen, glazed in ice water, and packed in cartons with heat-sealed cellophane or wax wrappers indicate that a quality very similar to that of the bagged frozen shrimp can be obtained.

Spring-caught gar-pike were found to have a frozen storage life of about 3 months at -4° F. before they became slightly rancid in taste and odor and light yellow or grey in the color of the flesh. Frozen fish fillet cartons made from duplex board became yellow in color on the inside from contact with fillets or fillet drip. Cartons made from sulphite board, which is glazed on both sides, did not discolor.

2.115

2.3

No universal cleaner available.--Since soils are so variable in composition and physical state, and water available for cleaning purposes usually contains varying proportions of a number of hardening constituents the use of soft water is emphasized. Where this is not possible the incorporation of water softening chemicals with the detergent is essential. Specific features of various detergents are not presented but reference is made to a list compiled by Dr. Dunn of the Department of Food Technology of Massachusetts.

Detergents and sanitizers contrasted.--While detergents usually refer to those materials which increase the cleaning effectiveness of water, sanitizers are such substances as hypochlorites, peroxides, perborates, and quaternary ammonium compounds which are effective in controlling the action of bacteria, yeasts, and molds. Thus a sanitizer which is chiefly germicidal is most effective on surfaces which have been thoroughly cleaned by appropriate detergent action.

Variability in sanitization costs.--Sanitization costs differ depending on such variables as: (a) type of product processed, (b) size plant and output of product, (c) extent of automatic equipment employed, (d) lay-out of plant, (e) continual versus shut-down type of sanitization practised, and (f) sanitization consciousness of management personnel. Excessive costs can usually be traced to certain specific operations, which as a rule involve excessive labor resulting from poor technique, or use of inadequate sanitization agents.

Importance of surface coatings emphasized.--Adequate maintenance of sanitization programs requires frequent painting of buildings and equipment. The particular coating chosen must be selected on the basis of its rate of drying, strength of adherence, durability, mold-inhibiting properties, and freedom from odor or color imparting to material which must come in contact with it. It is essential to be on the alert to detect any potential contamination or pollution condition that might arise from the use, misuse, or failure to use adequate protective coatings.

The accumulation of refuse in or around a warehouse is decried as unsightly, unsanitary, and demoralizing.

2.3 (Cross Reference: 1.86)

REDUCTION OF BACTERIAL CONTAMINATION ON FILLETS BY WASHING THE ROUND FISH AND BY THE USE OF MECHANICAL SKINNERS

Castell, C. H. (Atlantic Fisheries Experiment Station, Halifax, Nova Scotia) Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 58, 10-14 (July 1953)

In spite of the fact that, except in very old fish, the muscle of uncut fish is almost free from bacteria, fillets leave the end of the cutting table heavily contaminated with fish-spoiling bacteria. During cutting and skinning, the bacteria are transferred from the outside of the fish to the surfaces of the cutting tables and are then picked up from the cutting tables by the freshly cut fillets. Evidence indicates that approximately 80 to 90 percent of the fillet contamination occurs during the skinning operation.

There are several possible approaches to the problem of preventing the transfer of bacteria from the surface of round fish to the surface of the fillet: (1) An attempt can be made to keep the working surfaces clean at all times, however, as long as continuous recontamination occurs, this is costly and almost useless. (2) An attempt can be made to kill the bacteria in the slime on the surface of the fish by using some chemical treatment. Failure in all attempts so far is due to the fact that all germicide strong enough to destroy the bacteria imbedded in the slime have an unfavorable effect on the fish itself. (3) Surface slime can be removed by scrubbing. Most of the bacteria are removed with the slime and those that remain are more easily destroyed as they no longer have the protection of the slime. (4) Since the most serious fillet contamination occurs during the skinning operation, special precautions can be taken at this time to reduce this contamination.

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COMMERCIAL FISHERIES ABSTRACTS VOL. IX NO. 1 PAGE 7
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Kathryn L. Osterhaug

INVESTIGATION INTO THE NUTRITIVE VALUE OF ADRIATIC OYSTER (OSTREA EDULLIS LINNE)

Krvanig, M.
Acta Adriat. 5, 77-96 (1953)
Food Science Abstracts 27, 404 (July 1955)

Seasonal variations in the chemical composition of the Adriatic oyster during one year were investigated. On monthly samples, the proportion of meat in the oysters was examined, and glycogen was determined in the wet meat, and protein and mineral in the dried meat. The oysters contained the highest proportion of meat (1.5 percent) in February, and remained in the optimal marketable condition from January to April. After spring and autumn spawning, the meat content of the oysters diminished to 4.8 percent in May and 6.8 percent in November. The water content of the meat was highest (81.6 percent) in August and lowest (75.4 percent) in March. Protein content was highest (12.58 percent) in March and lowest (9.82 percent) in August. Fat content was highest (3.78 percent) in March and lowest (1.44 percent) in November, and glycogen content was highest (0.86 percent) in February and lowest (0.23 percent) in May. The period during which the protein value was highest corresponded to that during which the glycogen values were lowest. In February, when the glycogen content is maximum, the edible quality of the Adriatic oyster is considered to be at its best. The average calorific value of fresh oyster meat is 82 cal per 100 g, and is maximum in March and April.

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SANITARY FISH PROCESSING

SEASON VARIATION IN ADRIATIC OYSTER

IMPROVING THE EFFECTIVENESS OF NITRITE DIPS

Castell, C. H. (Atlantic Fisheries Experiment Station, Halifax, Nova Scotia) Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 58, 14-17 (July 1953)

Three factors which determine the effectiveness of preservatives are (1) concentration of the solution used, (2) number of bacteria on the fish, and (3) degree of acidity or alkalinity in the fish, a partial measure of quality.

The Federal Department of Health limits the concentration of preservatives to 0.2 percent minimum to 0.4 percent maximum amount of nitrites in solutions recommended for use with fresh fillets.

The alert operator can have some measure of control over the second factor, the number of bacteria on the fish at the time the preservative is applied, as shown by the following experiments. Two lots of haddock were taken from regular fishing vessels at a commercial fish plant. The first lot was iced for 4 days, the second, for 6 days. Both lots were divided into 2 groups and half of each was washed and the other half unwashed.

Cutters filleted and skinned the fish in a normal commercial manner.

The effect of washing on numbers of bacteria picked up by the fillets was as follows:

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Thelma Rose

A VISIT TO CROP'S OF OSTEND

Fox, Michael
World Fishing 4, 25-27 (June 1955)

A completely modern fish processing and freezing plant located in Ostend, Belgium is described. Covering an area of over 7,700 square yards, the facilities include a refrigeration and ice plant, a fish processing plant, and a reduction plant for the manufacture of fish meal.

Unique among its operations is the method employed for the manufacture of ice. The process is completely automatic and is operated by electronic controls throughout the whole cycle of freezing operations. Water is run into the freezing tubes and when the ice is formed, it slides out of the tubes, is cut into short lengths and is then carried by conveyor to large storage rooms. The author found no tendency for the small tubes to stick together in storage. For icing vessels, the ice is carried by conveyor out over the pier and through chutes into the vessels' holds. The largest Ostend trawlers, fishing in Icelandic waters, carry 150 tons of ice on each trip. An advantage claimed for ice made by this process is that it has no sharp edges to damage fish during storage.

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Roy C. Stevens

NITRITE DIPS FOR FILLETS

MANUFACTURE OF ICE

Of the four approaches suggested, the last two have been found to be most effective. Through experimentation it was demonstrated that washing fish before filleting reduces the bacterial count on the fillets from 80 to 99 percent and adds from one to six days to the keeping time of the fillets stored at 32° to 33° F.

Similar results can be obtained by using a machine skinner instead of skimming fillets by hand.

TABLE III

Comparison of the average bacterial counts on fillets from similar fish that were washed and not washed before filleting. These included 24 different lots of fish that had been previously stored in ice on the boats from 8 to 11 days.

Days in Hold at Sea	Average Bacterial Count per Gram		Per cent Reduction
	Unwashed Fillets	Washed Fillets	
11	28,000,000	420,000	98.5
11	23,000,000	300,000	98.26
11	8,400,000	450,000	94.7
9	13,200,000	105,000	99.24
9	1,800,000	140,000	92.22
9	4,200,000	165,000	96.07
8	643,000	58,000	90.97
8	450,000	15,000	96.68
8	2,500,000	170,000	93.2
7	1,380,000	61,000	95.62
7	740,000	21,000	97.12
6	374,000	14,400	96.14
6	298,000	98,200	66.84
6	1,070,000	10,000	99.06
6	169,000	9,000	94.66
5	212,000	57,000	73.1
5	205,000	36,000	82.43
5	147,000	17,000	88.42
4	144,000	8,000	94.46
4	106,000	9,000	91.6
4	35,000	9,000	74.2
3	155,000	10,000	93.54
3	150,000	10,000	93.33
3	42,000	9,800	76.7

Average count per gram
of fillet

Fillets cut from unwashed, 6-day-old fish
Fillets cut from washed, 6-day-old fish

990,000
13,800

Fillets cut from unwashed, 4-day-old fish
Fillets cut from washed, 4-day-old fish

122,000
28,500

Nitrite-treatment of fish stored at 36° - 37° F. doubled the keeping time of the fillets, but washing and dipping together more than trebled the keeping time.

The third factor, the acidity of the fish, can be controlled by proper handling and icing of fish at sea.

The preservative action of nitrite dip will be more effective if the number of bacteria can be reduced, the storage temperature controlled and the initial quality of the fish maintained.

FREEZING RATES AND ENERGY REQUIREMENTS FOR FREEZING PACKAGED FISH FILLETS AND FISH STICKS IN A MULTIPLE-COMPRESSION FREEZER - TECHNICAL NOTE NO. 32

Slavin, J. W. (Fishery Technological Laboratory, Boston, Massachusetts)
Commercial Fisheries Review 17, 21-26 (July 1955)

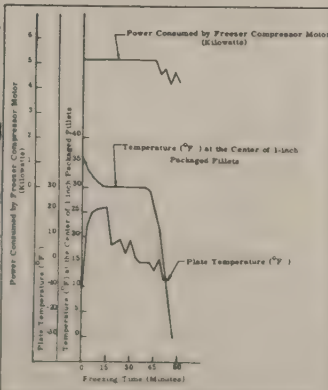


Figure 1

Pollack filets and fish sticks were frozen in a 6-station junior model multiple compression-type freezer (figure 1, left) designed to freeze about 200 pounds of 1-inch thick packaged fish filets per hour. A 7 1/2-h.p. 4-cylinder freon-12 compressor of 2.4 tons refrigeration at 0 pounds suction pressure per square inch gauge was employed. Records were kept of the temperature of the product and the electrical energy consumed by the compressor motor. Results are shown in table 1. over. It is more economical in terms of electrical energy requirements and freezer capacity to freeze 1-inch thick packages of filets than 2-inch thick or larger packages. Fish sticks freeze at a very slow rate because of the relatively large air space within the package and because of the insulation effect of the overwrap

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. E. Stansby

GAS-TRANSMISSION MEASUREMENT

Ellickson, B. E.; Hasezrahl, V.; and Huesong, R. V.
Mod. Packaging 27, 173-175 (1954)
Food Science Abstracts 27, 460 (July 1955)

To measure the gas-permeability of film materials, a sample of the film is creased, folded, and heat-sealed round hollow acrylic block of known volume, in a manner similar to that in which small retail food packages are handled. The acrylic block is pierced on all sides with 4 to 8 holes, 7/64 in diameter. The wrapped form is placed inside a gas-tight container of known volume, through which the gas to be tested (carbon dioxide, oxygen, or nitrogen) is passed at a rate of 50 to 75 ml. per minute for 1 hour. The gas flow is the stopped, and, after minutes, a sample of gas (5 to 10 ml.) is withdrawn from the jar and analyzed. After holding for 96 hours, a second sample is withdrawn and analyzed. The difference in concentration of gas in the 2 samples is a measure of the amount of gas which passed through the film in 96 hours. A study of the passage of gas from the inside outwards, the block is wrapped in a gas chamber containing the gas to be tested and stored in an atmosphere of air. Six different types of film were tested. The experiments showed that gases which permeated a film were able to pass in either direction. Since the film was subjected to physical stresses and strains similar to those which occur in a packaging operation, any effects thereby produced are reflected in the results.

FREEZING RATES FOR FILLETS

GAS PERMEABILITY OF FOOD FILMS

COMMERCIAL FISHERIES ABSTRACTS VOL. IX NO. 1 PAGE 9
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

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PACKAGING FROZEN FISH IN TIN RESULTS IN SUPERIOR STORAGE LIFE

Stansby, M. E. (Fishery Technological Laboratory, Seattle, Washington)
Commercial Fisheries Review 17, 17-20 (July 1955)

Access of air to frozen fish can result in three experimental changes: (1) Fish oils are oxidized and thereby rancid flavors develop; (2) Oxidation of pigments results in either a fading of the color or a discoloration; (3) With certain species of shellfish such as crab, the presence of air accelerates the development of a tough texture.

All packaging materials except those made of metal permit a slow seepage of air from the outside through the package into the frozen product. Tin cans not only keep all air from entering, but can also be evacuated, thus removing most of the oxygen originally present when the fish is packaged.

Experiments at the Seattle Fishery Technological Laboratory of the Fish and Wildlife Service carried out over a ten-year period have shown that fish frozen and stored in evacuated tin cans have a much longer storage life than when the fish are packaged in other ways. Such experiments, carried out with albacore tuna, silver smelt, Columbia River smelt, English sole, surf perch, Dolly Varden trout, steelhead trout, "true" cod, herring, pilchard, orange rockfish, sablefish, pink salmon, chum salmon, silver salmon, Pacific oysters, dungeness crab, king crab, and tanner crab showed that in every instance color and flavor (and in some cases texture) were better retained in the samples packaged in tin than by any other packaging means.

In the past, some objection to packaging frozen food in tin cans has been based upon the fact that the consumer might mistake the product for a heat-processed one and store it without refrigeration. So many frozen foods are now packaged in tin that this objection no longer seems valid.

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. E. Stansby

SUPER CHILL -- NEW FROZEN FOOD CONTAINER NEEDS NO COOLING EN ROUTE

Anonymous
The Canner 121, 15 (August 22, 1955)
National Provisioner 133, 14 (August 20, 1955)

A new and revolutionary method of shipping frozen food without refrigeration was tested recently when a cargo of frozen foods was started on its way to Caracas, Venezuela as deck cargo on a freighter.

The packages of food were brought to a level of 150 degrees below zero by spraying them with liquid nitrogen. Six-thousand pounds were packed into a seven-foot aluminum cube with six inches of insulation between the aluminum liner and the aluminum outer jacket. The shipment will receive no refrigeration during its long journey, but will still be below zero when it arrives at its destination more than a month after it left Chicago.

Food can be loaded into the large "super chill" container at room temperature and then frozen in the container. The container can be used to carry food to the warehouse or direct to the store without transfers between train and truck. This eliminates the danger of thawing and there also is no danger of refrigeration equipment breakdown.

Keeping the food below zero at all times will result in a better quality product and the new method should both facilitate domestic shipments and open up new markets overseas.

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Kathryn L. Osterhaug

FREEZING FISH IN CANS

SHIPPING FROZEN FOOD

3. 234 (Cross Reference: 3. 231)

The freezing rate results should be directly applicable to similar multiple-compression freezers of the same load capacity. The energy requirements would vary with the equipment used, but the energy ratios should apply to the majority of multiple-compression freezers in commercial use today.

Table 1

Packaged Product	Thickness of package Inches	Weight of Package Pounds	Time required to lower temperature of product to 0° F.		Product freezing capacity of unit in a 24-hour period Pounds	Ratio	Energy required to lower temperature of 1,000 pounds of product to 0° F. Kw.-hr.
			Minutes	Hours			
Fillet / 1	1	1	57	5	4,730	1.00	24.9
Fillet / 2	22	5	180	5	2,880	0.61	34.3
Fillet / 3	2 1/2	5	262	5	2,310	0.49	41.4
Fillet / 4	1 1/2	10/16	137	5	1,730	0.37	50.6
/1 Capacity load of 187 pounds unwrapped fillets in 1-pound waxed chipboard box - no overwrap							
/2 Capacity load of 360 pounds individually wrapped fillets in 5-pound waxed chipboard boxes with no overwrap							
/3 Capacity load of 420 pounds individually wrapped fillets in 5-pound waxed chipboard boxes with no overwrap							
/4 Capacity load of 165 pounds of breaded pre-cooked fish sticks (2 layers) packaged in 10-ounce waxed chipboard boxes with waxed overwrap							
/5 Initial temperature 36° F.							
/6 Initial temperature 65° F.							

3. 238 (Cross Reference: 3. 249)

In addition to the improved keeping quality of fish packaged in tin cans certain other advantages exist such as greater speed of handling and the use of high speed can-filling machines are used. Certain disadvantages which would have to be overcome are the relative difficulty of finding a can shape suitable for cuts of fish ordinarily frozen and the less efficient freezing of round cans were frozen in existing equipment designed for rectangular packages.

RATE OF FOOD FREEZING IN CHEST AND UPRIGHT HOME FREEZERS

Shodor, I. and Woodford, J. G.
Refrig. Engng 62, 45-46, 96, 98, 100, 102 (1954)
Food Science Abstracts 27, 470 (July 1955)

In this study, the freezers used were a 15.8 cu. ft. upright model. The products frozen were (freezing point 28° F. (-2° C.)) in 1-pound lots wrapped in different film materials. The rates of the freezers were measured at different positions in the freezers. The air temperature at the center of the freezer was about 0° F. (-18° C.), and the temperature of the product when placed in the freezer was 60° to 74° F. (21° to 23° C.). Food in cubical cartons, lying on the refrigerated surface, took 2 or 3 times as long to freeze as that in flat cartons. When the cartons were stacked two deep, freezing took 8 times as long; and when stacked three deep, 8 times as long, as when only one layer was frozen. Heat transfer was almost entirely by conduction, when similar cartons were in direct contact with a refrigerating surface. The rates of freezing were the same in chest and upright freezers. The rate of freezing was the same at different places on the same refrigerating surface, it was reduced if the freezer was partly filled with already-frozen food. The rate of freezing was fastest at the bottom of the freezer. The amount of food that can be frozen is limited to that which can be placed in direct contact with a refrigerating surface at any one time, the maximum being 11.7 and 23.4 percent of the total capacity of the chest and upright freezers, respectively. When cartons of unfrozen food were placed 1 layer deep on top of cartons of frozen food, the temperature of the frozen food rose to about 13° F. (-10° C.), then in about 25 hours, all the cartons reached a temperature of 0° F. (-18° C.) when the cartons of unfrozen food were two or more layers deep. Freezing took 11 hours and a temperature of 0° F. (-18° C.) was not reached for 57 hours. Chilling food to 41° F. (5° C.) before placing it in the freezer reduced the period required for freezing by one hour. If the upright freezer

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3 232 CHEMICAL CHANGES IN FISH PROTEIN DURING FREEZING AND STORAGE

Anonymous Commercial Fisheries Review 17, 10, 11 (August 1955)

A similarity exists for fish and shellfish to toughen during frozen storage. There is evidence to indicate that toughening is related to structural changes in the fish protein. Since these changes probably involve alterations in the shape and size of the protein molecules, a clue to the extent of these changes is the absolute viscosity of a solution of the thawed product.

A method has been developed whereby the protein fraction called actomyosin is isolated from fish muscle and subjected to viscosity measurements, yielding a value that is a function of the asymmetry of the protein molecule.

Yellow-striped rockfish (*Sebastes nebulosus*) meat that was held in frozen storage (-20° F.) up to 92 days was subjected to evaluation by this method at intervals during the storage period. At the same intervals, an estimation was made of the residual soluble actomyosin in dilute salt solution. The results of these tests are presented in figure 1, over.

The soluble actomyosin values increased toward a maximum value after about one-month's storage. They subsequently declined to approximately their initial value. A sharp drop in viscosity occurred within 1 to 2 days of storage and then remained quite constant. Other experiments indicate, however, a significant decrease in viscosity and solubility resulting either from long storage periods (approximately one year) at relatively low temperature (-20° F.) or short storage periods (approximately two months) at a relatively high temperature (10° F.). The change of state of the actomyosin apparently follows a time-temperature relationship.

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ABSTRACTER, Kathryn L. Osterhaug

FREEZING RATE IN HOME FREEZERS

FISH PROTEIN CHANGES

RECENT DEVELOPMENT IN FISH-FREEZING TECHNIQUES AND PENDING SCIENTIFIC PROBLEMS

Heen, Eirik (Norwegian Fisheries Research Institute, Bergen, Norway)
Symposium on cured and frozen fish technology, Swedish Institute for Food Preservation Research, Göteborg, No. 100, Chapter 15, pp 1-9 (November 1953)

Author discusses briefly the post-mortem biochemical processes occurring in fish muscle when held under various storage temperatures. A better and more complete understanding of the biochemical reactions taking place in fish muscle before and during freezing and thawing will lead to principles that will be useful for improving the freezing procedure, including pretreatment of the material, and possibly additional processes during the freezing itself. It was believed, at the moment, that, of the biochemical processes affecting the condition of the animal muscle, the important factor is the behavior of the muscle proteins myosin and actin, and their relation to the following observations: There is sharp disappearance in ATP (as measured by the author makes of labile phosphates) in fish muscle during freezing and thawing rates. There is also a rapid decrease in creatin-phosphate (CP) in cod muscles, aquarium fish kept without a struggle may be quite different initial levels of CP in cod muscles, aquarium fish kept without a struggle show much higher amounts of CP than fish from commercial ponds. Results of storage tests on frozen fish revealed that the quality change after storage for 6 months at -30° to -160° C. could be reached in 4 months when stored at -20° C. For protection of fish against atmospheric influences it appears that coating of blocks of fish with ice (glazing) offers the greatest protection. Denaturation of fish-muscle proteins during storage in the frozen state develops at different rates depending upon the storage temperature. Experiments to determine the effect on the consistency of

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3 30 ANNUAL REPORT TO THE DANISH FISHING INDUSTRY

Anonymous
Årsberetning fra Fiskeriministeriets Forsøgslaboratorium for 1954, 32 pages (1955). Copenhagen, Denmark

Non-sterile Canned Fish

General. -- The best method for determining the "total count" of living bacteria in 'Gaffelbidder' (herring tidbits) was to dilute and mix the minced meat or sauce or both with a sterile solution of 3.5 percent salt in tapwater and then plate out this dilution on meat broth peptone agar containing as added, the agar should be cooled to a pH of 6.8 to 7.0. Before the bacterial suspension is added, the agar should be cooled to 113 to 120° F. The poured plates are incubated aerobically at 68-72° F. This medium will support the growth of a majority of the bacteria present and make possible the isolation of the particular bacteria that are responsible for the swelling of canned non-sterile

The laboratory will try to determine if rapid swelling of canned 'Gaffelbidder' held at 75° to 95° F. is an indication of keeping quality at lower temperatures. Preliminary tests indicate that it may be possible to predict swelling.

Effect of acids in sauces. -- Spoilage of 'Gaffelbidder' was inhibited most by the acid content of the sauce; therefore, a maximum acid content is desirable. Icelandic spiced herring retained its desirable flavor without a loss in quality when prepared with a sauce that contained 2 percent acid and 40 percent sugar (30 percent sauce in the can). More than 2 percent acid in the sauce detracted from the quality of the 'Gaffelbidder.'

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ABSTRACTER: Martin Heerdt

FROZEN FISH BIOCHEMISTRY

DANISH FISHING INDUSTRY REPORT

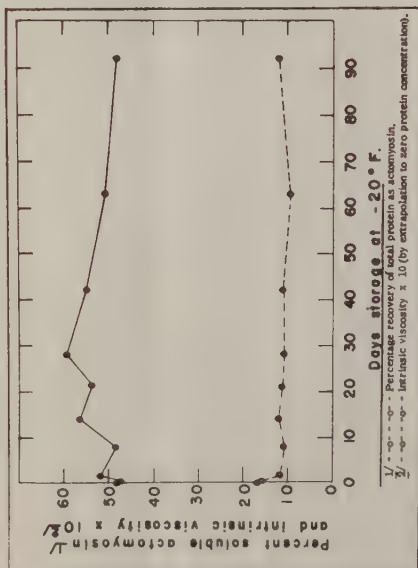


Fig. 1 - Viscosity and solubility properties of actomyosin isolated from frozen-thawed yellow-striped rockfish.

was empty, opening the door caused a rapid rise in air temperature, but this did not occur if the freezer was filled with food.

3. 30 (Cross References: 3. 8, 6. 55)

Caviar. -- Lump-sucker roe (raw) required 15 percent salt for preservation as caviar when stored in barrels at 50° to 60° F. The strong salt taste in caviar can be covered to a degree with a small amount of a mixture that contains 2 parts of white pepper, 2 parts of mace, 1 part of allspice, and 1 part of cloves.

Sterile Canned Fish

Processing time. -- The laboratory has published recommended processing times and temperatures for various products. These values are based on heat penetration studies.

Ensilage

Feeding studies. -- Sows will be fed unneutralized sulfuric acid fish ensilage to determine their tolerance for this food.

Dry fish ensilage. -- The keeping quality of a mixture of orange skin meal and fish ensilage was improved markedly by using a strongly acidified (sulfuric acid) fish ensilage in the mixture along with a mold reducing agent. Other types of dry materials were also tried in place of orange skin meal. Dry material (artificially dried 2 parts), sulfuric acid fish ensilage (3 parts), and 1 percent formic acid as a mold inhibiting agent gave a product with the best keeping quality.

Protein hydrolysis occurs in formic acid ensilage during warm weather. Attempts to avoid this inconvenient reaction by ensilaging with a formic acid salt, calcium formate, or with technical acetic acid denatured with 5 percent crude sulfuric acid were unsuccessful. The calcium formate mixture spoiled.

3. 239

the muscle (or the denaturation) by blocking ATP-ase activity of the muscle myosin, showed pronounced differences in the amount of "free-water" which was reflected in the organoleptic test for consistency, however, the test for labile phosphates showed only traces in all samples. The various conditions that remain are (1) can retention of the ATP-level be obtained, (2) will retention of the ATP-level keep the actomyosin in the dissociated state, and (3) will retention of the actomyosin in the dissociated state influence the denaturation of the proteins, apparently bringing about the undesired texture in frozen fish?

SOUTH AFRICAN FISH CANNING RESEARCH

Food Manufacture 20, 301 (July 1955)

The treatment of rock lobster by dipping in dilute citric acid solution before canning has been investigated following reports that the quality of canned crab was improved in this way. Announcing the tests, the South African Fishing Industry Research Institute reports that test packs showed a very slight improvement in color shortly after canning, while other qualities, such as texture, odor, and flavor, were unaffected. Storage tests are in progress.

Other experimental work on canning tested the relative merits of vacuum-sealing and exhausting. No differences were found after four months' storage and it was concluded that either method is suitable for high quality products.

Investigations on the best methods of storing rock lobster before canning showed that raw flesh keeps better than cooked fish under similar conditions, while tails alone stored better than raw whole fish. All samples withstood storage at room temperature and at 32° F. for 18 hours but only raw tails withstood storage for 46 hours at 32° F. Storing pre-cooked tails in sea water and crushed ice resulted in loss of flavor and texture, though no signs of spoilage were seen.

The method of grading frozen rock lobster tails for export has been revised by the South African Frozen Rock Lobster Packers (Pty.) Ltd. Grades are no longer to be determined by the number of tails per case but by weight.

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NEW ENGINEERING STEERS WAY TO NEW PRODUCT

Reprinted in whole

Salmon, macaroni and peas have been combined into a new specialty canned food product that needs only to be heated for serving.

The process: --Frozen salmon, heads off, are laid on perforated 45-pound parchment paper in trays each of which holds about 100 pounds of fish. These trays are stacked 7-high on a retort car and rolled into a 10-car double-end retort. The retort is closed and filled with 56° F. tap water. After the intake and drain valves have been opened slightly to permit circulation of water, the salmon in the retort is left overnight to thaw.

In the morning, the retort is drained, and the fish--now entirely free from slime, blood, and ice--are ready for precooking. Steam is admitted to the retort, and the fish are held at 218° F. for 60 minutes. The cars of cooked fish are then rolled from the retort to the draining table. Here the fish (still firm) are removed from the trays, placed on the table, cleaned to remove skin, bones, and discolored areas, and separated into two fillets per fish. These fillets are loaded by machine at the rate of 500 pounds per hour and discharged onto an ingredient belt that is used to proportion the three major ingredients. Precooked macaroni and frozen peas are now added from their own individual conveyors to the cooked salmon, already on the ingredient belt. These three ingredients are eventually discharged into a can filler.

Each empty can receives a quart of rottomseeded oil and 1 cc. of monosodium glutamate (MSG) solution, made by dissolving 1 pound of MSG in 1 gallon of water, before it enters the can filler.

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ABSTRACTER: Martin Heerdt

FISH CANNING RESEARCH

SALMON, MACARONI, PEA PRODUCT

ADVANCED SARDINE-CANNING OPERATION

Food Engineering 27, 48-49, 99, 102-105 (August 1955)

Sardines for canning are impounded in weirs for 24 hours to allow time for elimination of feed from their stomachs. A fish pump is then used to lift the sardines from the weir into the vessel hold. Salt added to the sardines in the hold acts as a temporary preservative until they can be unloaded at the cannery. Unloading begins after the sardines have been inspected by the State of Maine.

At the cannery the sardines are pumped through a 6-inch hose into one of four 13-foot diameter wooden storage tanks in the plant and held in saturated salt brine. Sardines are flumed from these tanks as needed to an open mesh belt conveyor that lifts them to the raw fish belt which supplies the packing stations. Girl packers on each side of this belt shunt the sardines onto the packing tables as needed. Excess sardines are re-cycled.

Each packer uses a pair of scissors to remove the head and tail from the sardines and to cut them to size for canning. Trimmings from the packing tables are carried to another part of the plant for manufacture in meal and oil. The cut sardines are then packed into rectangular flat cans which the packer obtains from an overhead hopper. Each can holds 5 to 7 fish. When packed these cans are grouped on trays (32 cans per tray).

Filled trays are collected and delivered on carts to the intake end of the continuous sardine cooker that is diagrammed and shown on the cover. Here the trays are transferred by hand to the cooker chain. As each tray of cans enters the cooker it is covered with a grid that is locked in place. This grid retains the fish in their cans as they travel through the cooker at the rate of 8 trays per minute. Immediately after entering the cooker the fish are washed with high pressure sprays of water and allowed to drain as they travel up a 135-degree incline. The fish now enter 5 cooking zones, where they are (1) steamed right side up, (2) heated upside down in hot air, (3) heated right side up in hot air, (4) heated upside down

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ABSTRACTER: Martin Heerdt

COOL STORAGE OF LIGHTLY SALTED FISH IN KENCH AND UNDER PICKLE

Castell, C. H. (Atlantic Fisheries Experimental Station, Halifax, Nova Scotia)
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 56, 17-22 (July 1953)

During times of glut in the salt fish industry the quality of lightly salted fish is in jeopardy. If it were possible to store the fish before drying, the problem would be less severe.

For successful storage of green salted fish it is necessary to know the temperature required for preservation and whether the fish can be stored longer in kench or under brine. The purpose of the work reported in this paper was to find out what effect the storage temperature has on the keeping time of lightly salted fish.

Stored in kench: --Fish were salted with 16 pounds of salt per 100 pounds of split fish, kench for four days at 58° F., and then stored at various temperatures. Spoilage was determined organoleptically by noting spoilage odors and surface slime. The results are reported in table 4, over.

Stored under pickle: --Split fish were salted down in small barrels, using 10, 12, 14, and 16 pounds of salt per 100 pounds of split fish. The fish were weighted down to keep them under the surface of the brine. Spoilage of fish under pickle differs from that of fish in kench. It is slower in developing and is apparently caused by a different type of bacteria. Table 5, over, summarizes the results of storing fish in brine at three different temperatures.

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ABSTRACTER: Kathryn L. Osterhaug

SARDINE CANNING OPERATION

SALT FISH PRESERVATION

TABLE IV

Keeping time of kenched fish caught during summer and winter days, at various storage temperatures

Storage Temperatures	Keeping Time	Period of Year
84°F.	10 to 20 hours	August
84°F.	14 to 20 hours	August
70°F.	12 to 18 hours	June
66°F.	2 to 3 days	June
45°F.	6 to 9 days	January
45°F.	6 to 7 days	August
45°F.	16 to 21 days	January
37°F.	23 to 27 days	January
33°F.	11 to 14 days	June
33°F.	30 to 34 days	January

TABLE V

The approximate number of days in storage before:
(1) the pH of the brine near the surface began to incline sharply upward, (2) the first slightly sour odors developed, (3) the fish developed a strong spoilage odor: for fish salted with 12, 14, and 16 pounds of salt per 100 pounds of green fish and stored under brine at 36°, 50°, and 65° F.

Pounds of salt per 100 pounds of fish	Storage temperature °F.	Number of days to produce		
		pH Rise	Slightly sour odour	Spoilage odour
16	65	18	21	37
	50	29	36	53*
	36	112	140	over 160**
14	65	17	20	29
	50	23	26	53*
	36	77	109	over 160**
12	65	14	15	19
	50	23	26	48*
	36	67	102	over 160**

*Experiment terminated at 53 days.

**Experiment terminated at 160 days.

3. 5

The salmon, macaroni, and pea mixture is then filled into the can, water is added from a perforated pipe, and dry salt is added from a dispensing machine. Each can is then topped with a plunger to obtain a uniform headspace, hermetically sealed in a steam flow double seamer, washed, jumbled, packed into retort baskets mounted on cars, rolled into the retort, cooked at 240° F., water cooled to 100° F., labeled, and cased.

3. 33

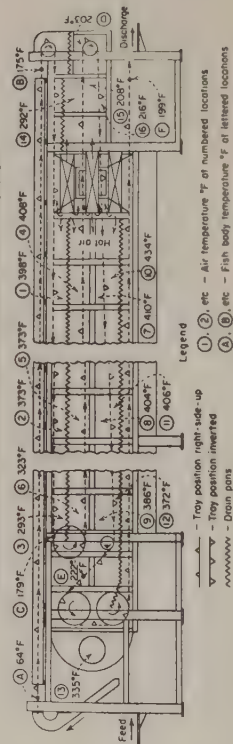
3. 3

Research on the chilling of pilchards before canning indicates that there are at least four or five different methods of chilling pilchards which are commercially satisfactory. Cooling fish after cutting and evisceration appears to be cheaper than chilling whole fish if the layout of the cannery permits the installation of extra cutting machines and buffer holding tanks. Chilling whole fish by direct refrigeration of circulating water has the advantage of causing little disturbance to existing plant layout. The addition of crushed or flaked ice to the fish holding tanks involves low expenditure and reasonable working costs. Pilchards chilled in the cannery to 35° F. or lower can be kept in good condition for two days. Investigations are now being made on the possibility of preserving quality by cooling soon after catching.

3. 33 (Cross Reference: 1. 2)

down in hot air, and (5) heated right side up in hot air. Product temperature is increased in each zone to remove moisture and to give the fish a toasted appearance. Temperature and time in each zone is automatically controlled. As the fish emerge from the cooker the grids are unlabeled from the trays and placed manually on conveyors that run the fish from the retort to the cooler. At the same time the trays are automatically disengaged from the retort and the cans are shuttled from the trays onto a conveyor where oil is added to each can and a lid is double sealed on each can. Sealed cans are spray washed to remove excess oil, processed at 240° F. for 40 minutes, water cooled, discharged from the retort, air cooled, cased, and put into storage.

TEMPERATURES AND FLOW IN CONTINUOUS SARDINE COOKER AND OVEN



6.190 IMPORTANT MILEPOSTS IN POULTRY FEEDS AND NUTRITION Schable, Philip J. (Michigan State College) <i>Fedstuffs</i> 27, 42 (May 21, 1955) Here are listed some of the discoveries or developments that had a great impact on the science of poultry nutrition, poultry feed formulation and the commercial production of poultry. 1880 Realization of need for forage in winter to get summer results. 1909- Dry mashes. 1912 "Accessory food factors." Sir Frederick Hopkins. Named "vitamins" by Funk. 1908- Vitamin A and vitamin A activity of carotene--protection against nutritional roup, etc. 1914 Major mineral requirements such as calcium and phosphorus and their relation to growth 1910+ and egg production. 1913 Fat-soluble vitamins distinguished from water-soluble vitamins by McCullum. 1922- Vitamin D--making it possible to rear poultry throughout the year and making confinement 1924 methods possible. Commercial marketing of cod-liver oil and CLO concentrate. Irradiation--recognition of sunlight as a source of vitamin D in chickens and ultraviolet light as a means of commercially producing vitamin D. McCullum. 1928+ Multiple nature of vitamin B. 1933 Synthetic production of water-soluble vitamins. Riboflavin isolated--partly responsible for nutritional values of milk, alfalfa and yeast. Commercially available in 1940. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. IX NO. 1 PAGE 15 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE Reprinted in part	6.191 FISH MEALS AS AMINO ACID SOURCES IN CHICK RATIONS Grau, C. R. and Williams, M. A. (Department of Poultry Husbandry, University of California, Berkeley, California) <i>Poultry Science</i> 34, 810-817 (July 1955) Objectives. --These investigations were designed (1) to evaluate the quality of a representative number of fish meals as amino acid sources for the chick and (2) to relate the quality of the raw material and the processing methods to the quality of the final product. Materials and method. --The fish meals used in this study were commercial meals obtained from fish processors, feed manufacturers, or the California Department of Agriculture. The chick growth method of estimating the protein quality was used. Two-week-old White Leghorn chicks, which had been fed a stock diet for the first two weeks after hatching, were divided into selected groups of 10 chicks each and fed the experimental diets. Fish meal was present in the diets at a level sufficient to supply 20 percent of the crude protein (N X 6.25). Vitamins, minerals, fat, and glucose (celose) were supplied by purified materials to bring the total to 100 percent. The experiments were continued for eight days during which time the chicks were weighed every second day. Growth rates (percent daily gain) were calculated for each chick by dividing the gain per day by the average of the initial and final weights and multiplying by 100. The fish meal was depended upon to supply only the needed amino acids. Data was not obtained on the value of the meals as vitamin and mineral sources. A study made with a low- and high-quality meal supplemented with crystalline vitamin B₁₂ showed that the vitamin B₁₂ content of the various fish meals was adequate for growth. Results. --Fish meals which resulted in growth rates of 5.7 percent to 7.1 percent per day were called good amino acid sources; meals which allowed a growth rate of 4.3 percent to 5.7 percent were (over) COMMERCIAL FISHERIES ABSTRACTS VOL. IX NO. 1 PAGE 15 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerdt
6.192 UNIDENTIFIED GROWTH FACTORS REQUIRED BY CHICKS AND POULTS 4. EXPERIMENTAL VARIABLES WHICH INFLUENCE THE DIETARY REQUIREMENTS OF CHICKS FOR THESE FACTORS Arscott, G. H. and Combs, G. F. (Department of Poultry Husbandry, University of Maryland) <i>Poultry Science</i> 34, 843-850 (July 1955) This study was made to determine some of the causes of variability encountered in chick growth assays. Ten experiments were conducted. Experimental. --Day-old New Hampshire chicks of both sexes were fed in all experiments except experiment 6 in which New Hampshire Silver Cornish crossbred males were fed. All New Hampshire chicks were the progeny of dams that had been housed on raised wire floors and had received rations containing no animal protein supplements. The parental stock for experiment 6 had been housed on litter and had received a complete ration containing fish meal. Findings. --Chick growth on a basal diet with various supplements was used to measure the effect of iodinated casein, different carbohydrate sources, and different levels of vitamins, multiple deficiency states, and sex as variables in unidentified factor assays. Iodinated casein, 0.03 percent, in the diet increased the sensitivity of the experimental assay for an unidentified growth factor or factors contained in a dried whey product and a liver product that was fed alone or in combination. Significantly greater responses to unidentified factor supplementation were obtained when celose was used as the carbohydrate source as were obtained if celose was used. High levels of vitamins in the diet appeared to spare partially the chick's dietary requirement for the unidentified factor contained in condensed fish solubles, although the levels tested showed no consistent effect. Multiple deficiencies of unidentified factors were encountered which, under certain experimental conditions, (over) COMMERCIAL FISHERIES ABSTRACTS VOL. IX NO. 1 PAGE 15 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerdt	6.193 THE INFLUENCE ON PALATABILITY OF CERTAIN GRAIN COMBINATIONS, FISH SOLUBLES, AND A VITAMIN B₁₂-AUROMYCIN SUPPLEMENT IN POULTRY RATIONS Odland, Lura M.; Mayfield, Helen L.; and Page, Louise (Montana State College, Bozeman, Montana) <i>Poultry Science</i> 34, 822-831 (July 1955) Single Comb White Leghorn or New Hampshire broilers that received rations containing simple combinations of wheat and oats or wheat and barley were equal to or superior in palatability to broilers that received rations containing more complex combinations of wheat, barley, bran shorts, wheat bran, and/or corn. The palatability of Broad Breasted Bronze turkeys that received the more complex combinations was superior to that of turkeys that received simple combinations. The addition of 3 percent fish solubles to the rations of Broad Breasted Bronze turkeys improved the aroma, flavor, juiciness, and general desirability of the light meat and the flavor, juiciness, tenderness, and texture of the dark meat. No off flavors could be attributed to the use of fish solubles when samples were scored fresh or frozen after storage of six months. Fish solubles, 3 percent, did not improve the palatability scores of Single Comb White Leghorn broilers although no off flavors could be attributed to the use of fish solubles. Palatability scores for the tenderness and texture of the light meat from Single Comb White Leghorn broilers that received a vitamin B₁₂-auromycin supplement, 20 micrograms vitamin B₁₂, and 20 milligrams auromycin per kilogram of ration, were significantly higher than scores for the control broilers. Palatability scores on the meat of Broad Breasted Bronze turkeys that received a vitamin B₁₂-auromycin supplement were no different than the scores of the meat from the control turkeys. COMMERCIAL FISHERIES ABSTRACTS VOL. IX NO. 1 PAGE 15 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerdt
GROWTH FACTOR EFFECTS EFFECTS OF SOLUBLES ON MEAT FLAVOR	MILEPOSTS IN POULTRY FEEDS MEALS AS AMINO ACID SOURCES

6. 195

called fair, and meals which allowed a growth rate of less than 4.3 percent per day were called poor. The data in table 2, below, shows clearly that quality was not related to protein content.

Considerable variation was apparent among the six kinds of fish studied. The data in table 3, below, indicates that fish meals of high protein quality can be produced from any of the six kinds of fish. Four of seven flame-dried meals were good sources of amino acids for the chick, whereas three flame-dried meals, four steam-dried meals, and one vacuum-dried meal were only fair sources. This data demonstrates that no one drying method is superior, and that meals of high quality as well as low quality can be produced by all of the drying methods. Out of five samples of steam-dried meal, prepared by five different processes, from one day's catch of sardines, four permitted good growth and one permitted only fair growth.

TABLE 2.—Distribution of fish meal samples of varying crude protein contents according to their values as sole animal and mineral sources of protein and amino acids in parenteral diets

Crude protein, percent	Numbers of meals with growth				Total numbers of meals
	5.7% (100% per day)	4.7% (100% per day)	4.3% (100% per day)	4.0% (100% per day)	
35-40	2	1	1	0	5
40-45	19	17	1	1	41
45-50	4	5	0	0	9
50-55	0	0	0	0	0
55-60	0	0	0	0	0
60-65	0	0	0	0	0
65-70	0	0	0	0	0
70-75	0	0	0	0	0
Total numbers	25	42	13	1	101
Percent of total	25	42	13	1	101

TABLE 3.—Protein quality of fish meals produced from various species of fish

Kind of fish	No. of samples	Numbers of meals with the growth			
		5.7% (100% per day)	4.7% (100% per day)	4.3% (100% per day)	4.0% (100% per day)
Sardines	17	3	1	1	9
Tuna	17	3	1	1	9
Yellow perch	17	3	1	1	9
Rock bass	17	3	1	1	9
Menhaden	17	3	1	1	9
Atlantic croaker	17	3	1	1	9
Total	101	25	42	13	1

6. 190 (Cross Reference: 0. 7)

- 1934 Importance of the ratio of one mineral to another, i.e., ratio of calcium to phosphorus.
- 1936+ Vitamin D₃ as the most efficient source of vitamin D for poultry. Soybean oil meal and improved methods of processing—provided necessary supplies of protein for increased poultry production. Thiamine first isolated.
- 1937 Trace minerals—such as manganese to prevent leg abnormalities. Fish meal and fish solubles—as excellent protein and source of vitamins.
- 1938 Dehydration of alfalfa—supplied economical source of forage nutrients.
- 1939 Vitamin B₆ (pyridoxin hydrochloride) first synthesized. Vitamin E (tocopherol) identified. Riboflavin and niacin marketed commercially.
- 1940 Vitamin E and alpha-tocopherol commercially offered. Pantothenic acid synthesized and offered commercially. Vitamin K, choline, biotin known.
- 1941 Fermentation products—sources of vitamin B-complex unknown factors.
- 1942 Nutrient requirements for various nutrients for poultry at different ages.
- 1943 Nicotin-tryptophane-corn relationship increased use high-calorie grains.
- 1944 Microbiological methods to assay vitamins and amino acids.
- 1946 Folic acid discovered.
- 1948 High energy feeds—gave new values to corn—cost less per unit of energy.
- 1949 Vitamin B₁₂ isolated in pure form. Was the "Animal protein factor."
- 1950 Vitamin B₁₂ offered commercially. Mechanical feeders—reduced labor cost of feeding. Non-nutrient growth stimulants—antibiotics, arsenicals, etc., which control intestinal microorganisms. "Intestinal pollicemen."
- 1951 Commercial production of amino acids such as methionine.
- 1951 Animal rates for energy.
- 1953 3 unidentified factors for growth of which the "fish factor" and "whey factor" are of practical importance.
- 1955

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may influence the chick's response to these factors. Condensed fish solubles appeared to contain two factors. One of these factors was present in liver fraction 2, and the other factor was present in dehydrated alfalfa meal (table 5, below). Under certain conditions, female chicks responded to a greater extent than did males to the inclusion of liver products or fish solubles in the diet.

TABLE 5.—Evidence for multiple factors in condensed fish solubles

Group	Supplement	4-wk. gain (gm.) ¹			
		Exp. 6	Exp. 7	Exp. 9	Exp. 10
1	None	225 ± 19 (7)	165 ± 13 (14)	173 ± 7 (26) ²	197 ± 25 (9)
2	20% liver fraction 2	252 ± 23 (9)	213 ± 12 (14)	180 ± 15 (15)	196 ± 12 (9)
3	40% liver fraction 2	302 ± 10 (11)	230 ± 13 (15)	188 ± 14 (13)	235 ± 17 (10)
4	40% fish solubles	—	—	223 ± 11 (14)	268 ± 14 (10)
5	2.5% fish solubles	—	—	184 ± 9 (13) ²	259 ± 19 (8)
6	2.5% alfalfa meal, dhy.	—	—	—	240 ± 15 (10)
7	5% alfalfa meal, dhy.	—	—	227 ± 9 (15) ²	254 ± 20 (9)
8	As 5+2% liver fraction 2	—	—	229 ± 15 (15)	273 ± 21 (9)
9	As 5+4% fish solubles	—	—	—	—

() No. surviving chicks.

¹ Significant differences at the 5% level exist between groups 1 vs. 4 either individually or combined. Similar differences exist between groups 1 vs. 7 or 8 when exp's. 9 and 10 are combined. When considered singly differences between groups 1 vs. groups 5 or 6 in experiments 9 and 10, respectively, are not significant; the difference between group 1 vs. 5 in experiment 10 is significant. Significant differences exist between groups 5 vs. 8 (t-test).

² Average of 2 groups.

³ Contained 20% alfalfa meal.

THE CHARACTERISTICS OF FISH MUSCLE PROTEINS

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Hamoir, G.
Symposium on cured and frozen fish technology. Swedish Institute for Food Preservation Research, Göteborg, No. 100, Chapter 8, pp 1-15 (November 1953)

The author reviews current contributions describing the general picture of fish muscle proteins given by the electrophoretic study of whole extracts of fish muscle. The isolation and properties of some of the components of the extracts are also described.

The occurrence in muscle of structural proteins extractable from an ionic strength of about 0.35 has led to the distinction of two types of whole extract, ones of low ionic strength (0.05-0.2) containing an albumin fraction, the myogenin, and a globulin fraction soluble at low ionic strength called globulin X, and the ones of high ionic strength (equal to or greater than 0.35) containing also the structural proteins myosin, actomyosin, and tropomyosin.

The heterogeneity of fish myogens extracted at low ionic strength and the constancy of fish structural proteins extracted at high ionic strength agree well with the comparative work carried out in this field. Although the electrophoretic behavior of actomyosin is identical regardless of the source, sedimentation studies reveal that several actomyosins exist with different sedimentation rates.

The peculiarity of fish muscle appears to be due mainly to a much more loose association of its different structural elements revealed by the easy release of tropomyosin and actomyosin. The technical problem posed by fish to the protein chemist appears to be essentially related to the stabilization of this fragile structure.

COMMERCIAL FISHERIES ABSTRACTS VOL. IX, NO. 1, PAGE 17
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Harry L. Seagr

BIOCHEMICAL STUDIES ON OCTOPUS I. TRIMETHYLAMINE AND TRIMETHYLAMINE OXIDE CONTENT OF OCTOPUS

8. 8

Asano, Motokazu and Sato, Haruo (Tohoku University, Sendai, Japan)
The Tohoku Journal of Agricultural Research, No. 3, 191-195 (December 1954)

Three species of octopoda (Octopus vulgaris, Octopus faugaisi, and Octopus dofleini) landed at Port Yuriga and Shiwagawa, Miyagi Prefecture from November 1952 to February 1953 were studied.

Extraction of sample. -- Fifty milliliters of formaldehyde solution (20 percent) were stirred into 100 grams of minced sample. The mixture was allowed to stand overnight for extraction. A filtrate was obtained for analysis by filtering the mixture through 2 sheets of gauze.

Estimation of trimethylamine (TMA). -- The method used to estimate (TMA) was principally the method of Dyer et al (1952) except that microdiffusion was carried out using the Conway technique.

Estimation of trimethylamine oxide (TMAO). -- Devarda's alloy (1 gram) and 6 N hydrochloric (2 milliliters) were added to 5 to 10 milliliters of the tissue extract in an Erlenmeyer flask. This flask and its contents were then placed in a boiling water bath and held there for 15 minutes. When cool, its contents were used in an estimation of the total TMA by the procedure described above. The TMAO content was obtained by subtracting the initial TMA value from the total TMA value.

Results. -- The results obtained are shown in tables 2 and 3, over.

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL. IX, NO. 1, PAGE 17
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerd

TRUEST EVALUATIONS IN SENSORY PANEL TESTING

Krum, Jack K. (Division of General Education, New York University)
Food Engineering 27, 74-83 (July 1955)

The latest sensory testing panel techniques embrace six distinct steps. They are as follows:

Selecting panel members. -- The individuals chosen should have a fair ability to distinguish between different levels of the property or properties to be evaluated and should be interested in sensory judgments. The initial test toward the selection of a panel might be a candidate questionnaire, itemizing items to be covered are: (a) experience, (b) availability, (c) age, (d) sex, (e) health, (f) smoking habits, (g) quantity of the particular goods habitually consumed, and (h) prejudices. The second step is to test the selected group for sensitivity to the four primary tastes--salt, sour, bitter, and sweet. The third step is to test the selected group for sensitivity to lactic acid, caffeine, and sucrose. The fourth step is with chemically pure solutions of sodium chloride, lactic acid, and sucrose. The fifth step is to test each individual for his discriminatory power. The most widely used method is the triangle test, in which three coded samples are presented--two alike and one different--and the tester is required to identify the different one. Degree of difficulty or amount of flavor difference for each test should be such that the number of correct judgments is significantly above the chance level (33 1/3 percent) but not so easy that more than 80 percent of the judgments are correct.

Panel size and training. -- For routine investigations and difference testing, 10 to 30 testers will suffice. They should be trained on the products to be tested--the system of evaluation should be nearly the same as that used in the actual test.

Choosing the tests (Types and Uses). -- The statistical design of the experiment should give a maximum of information with a minimum of bias and at the least cost and effort. The problem on hand (over)

COMMERCIAL FISHERIES ABSTRACTS VOL. IX, NO. 1, PAGE 17
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Martin Heerd

THE AMINO ACID CONTENT OF FISH MUSCLE PROTEIN

8. 51

Suginura, Kei-ichiro; Taira, Hirokazu; Hoshino, Naoki; Ebisawa, Haruo; and Nagahara, Taroh
(Food Research Institute, Ministry of Agriculture and Forestry, Fukushima Tokyo)
Bulletin of the Japanese Society of Scientific Fisheries 20, 520 (1954) (In English)

Arginine, aspartic acid, glutamic acid, glycine, histidine, isoleucine, leucine, lysine, methionine, phenyl-alanine, proline, proline, serine, threonine, tryptophane, tyrosine and valine, of the muscle protein of bonito, horse mackerel, turbot and two species of squid were determined by means of microbiological assay technique.

The arginine, histidine and lysine values of Block & Bolling were determined by Kossel-Kutcher's method; the leucine, isoleucine and valine, by the phenyl-alanine, by the Kapeller-Alder's method, which Millon's test, to be believed very accurate, and threonine and serine by the method of Block-Nicolet and often shows high value; and the imino acids, were determined with the microbiological method Shim-Nicolet. The values given for all of the amino acid except phenylalanine for which Lactobacillus using Streptococcus faecalis R for all of the amino acid were determined by Hatzokshi using the Baranowski and the Shim-Nicolet's method respectively. Values by Schormüller et al. were of dry protein from decapitated and eviscerated fresh water fishes.

Table 1. Total Nitrogen of Sample Proteins

Sample	Total Nitrogen
Squid I	16.3%
Squid II	14.6%
Bonito	17.4%
Horse Mackerel	16.1%
Turbot	17.6%

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL. IX, NO. 1, PAGE 17
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Martin Heerd

SENSORY PANEL TESTING

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FISH MUSCLE PROTEINS

TRIMETHYLAMINE IN OCTOPUS

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may prevent partially defrosted merchandise or complete spoilage.

7. Check location of icing stations en route to destination to see if properly spaced to insure re-icing every 12 to 16 hours, at least during hot weather.

8. Avoid circuitous routings.

9. Trucks are susceptible to a tremendous amount of heat over the highways during hot weather. Check for unreasonable lay-overs on long-haul shipments.

10. The shipper is generally held responsible for the condition of the merchandise on arrival to destination. An ounce of prevention will save claims and a disappointed customer.

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edible portions of the body are cleaned, filleted, deep frozen and packaged, ready for distribution ashore, and the remainder of the body, the offal, livers, etc., are reduced to their basic byproducts.



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Chemical Abstracts	Journal of the Association of Official Agricultural Chemists
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Food Manufacture	Quick Frozen Foods
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